

Visual Analysis of Online English Learning Engagement

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Abstract

Learning engagement refers to learners' active participation in classroom learning activities or involvement in learning (Guo Jidong, 2018), which has been a research hotspot in the field of education. With the development and application of the new classroom model, the research on online English learning engagement has attracted more and more attention in recent years. By using bibliometric analysis software CiteSpace and UCINET, this study visualized 553 papers related to online English learning engagement included in the core collection of Web of Science from 2017 to 2021 and drew keyword co-occurrence maps and thematic/keyword clustering maps of highly cited literature. To summarize the status quo of relevant international research. The results show that international online English learning engagement research focuses on the comparative analysis of the influence of online teaching mode and traditional teaching on learning engagement, the choice of teacher's strategy and assessment, and the changes in learners' emotional and cognitive levels in online learning. The study suggests that educators should adjust their teaching strategies in time, and pay attention to the positive changes in learners' emotions and the improvement of their cognitive ability, to improve learners' online English learning engagement and promote English learning.

Keywords: online English learning engagement, visual analysis, emotion

1. Introduction

Given the popularity of new computer-assisted teaching modes such as remote live teaching and online classrooms, the research on online English learning engagement is of great significance for timely exploring learners' learning under the new teaching mode and is also the key to explore how to effectively promote learning engagement in the online teaching environment to ensure the quality of learners' online learning. It is also an important

form of English learning. 2017-2021 is the five years of rapid development of online teaching. Analyzing the current situation and characteristics of online English learning engagement in international academic circles during this period, as well as timely understanding and grasping the trends and frontier focus of relevant international research, is of great enlightening significance for the research on online English learning engagement in China.

With the help of CiteSpace and UCINETV6.0 econometric analysis software, this study visually analyzes the relevant research on online English learning engagement included in the core collection of Web of Science (WOS) from 2017 to 2021, indicating the research status of international scholars in this field in the past five years. The aim is to provide some inspiration for the research on online English learning engagement in China by showing the research hotspots and important research topics of international online English learning engagement.

2. Data Sources and Analyzing Tools

2.1 Data Sources

This study chooses the core collection of the Web of Science database as the starting point to fully analyze the research hotspots and characteristics in the field of international online English learning engagement. In this study, relevant literature whose official publication time is 2017-2021 are selected as the target literature. First, in this database, the search subject term was set as “online English learning engagement” and the Research direction was set as “Education Educational Research” and “Linguistics”. And other categories were excluded. The document type was refined to “Article”, and other document types such as meeting minutes and book chapters were excluded. The language was selected as “English”. Finally, 553 relevant documents were obtained.

2.2 Data Analyzing Tools

The analysis tools selected in this study are mainly CiteSpace and UCINET bibliometric visualization analysis software, which are suitable for various complex network analyses,

presentation of cooperation graphs and co-occurrence graphs, and co-occurrence cluster analysis of keywords. Based on these two types of software, this study conducted a more in-depth analysis of the publishing country/region, publishing institution, core author, keyword clustering, etc., to scientifically present the international research hotspots and frontiers in the field of online English learning engagement.

3. Trends of International Online English Learning Engagement Research

3.1 Number of Annual Publications and Countries/Regions with High Publications

3.1.1 Annual Publication Analysis

The annual publication volume of relevant papers in international journals can reflect the overall situation of this research field, and reflect the historical development and research hot period of this field from the time dimension. After sorting out the data of 553 articles to be analyzed, a line chart of the annual number of published papers is obtained (seen in Figure 1.). In terms of the overall trend of published papers, the number of published papers has shown an upward trend in the past five years, staying above 70 in most years, and exceeding 100 and 200 in 2020 and 2021, respectively. It can be seen that relevant research on online English learning engagement has attracted more and more attention. The surge in the number of published papers from 2020 to 2021 also reflects, to a certain extent, the rapid development of computer-assisted teaching and the popularity of the new online classroom teaching model that combines online and offline in the current education field.



Figure 1. The number of annual publications during 2017-2022

3.2 Core authors and Studies with High Citation

3.2.1 Core Author Community

Based on Price's law, this paper analyzes the core group of authors engaged in online English learning from the perspective of the number of authors' publications and the number of authors' citations. The analysis of the core author group can discover and excavate the scientific research level of the research field. Price's law indicates that the number of core authors' publications is at least M_p , which can be calculated by the formula:

$$M_p = 0.749 * \sqrt{N_{pmax}}$$

N_{pmax} represents the total number of publications by the most prolific authors in the collected data. Among the 553 data collected, the most prolific author is Hew, K.F., who has published 7 pieces of literature in the past five years, that is, $N_{pmax}=7$. After the calculation of the formula, the integer value is taken to obtain $M_p=2$, that is, authors with at least 2 publications are defined as the group to be selected for high-prolific authors.

The highly cited author population was identified in the same way. Price's law shows that the lowest co-citation frequency of the core author is M_c , which is calculated by the formula:

$$M_c = 0.749 * \sqrt{N_{cmax}}$$

N_{cmax} is the highest number of co-citations for authors in the collected data. Among the 553 data collected, up to the retrieval time, the highest cited author was Martin and Florence, whose works in the past five years had been cited 266 times in total, that is, $N_{cmax}=266$, and $M_c=12.21$, whose integer was 13, that is, authors with a total of 13 citations were highly cited authors group. Take the intersection of the high-yield author group and the highly cited author group determined by the calculation, that is, remove the authors who meet the criteria of number of publications but do not meet the number of citations, and the authors who meet the criteria of number of citations but do not meet the requirement of number of publications. Taking into account factors such as co-authors, the author group clustering method is finally selected for analysis. There are three core author groups, and the representative authors of each cluster are: a) Martin, Florence; b) Hew, Khe

Foon; c) Pierre, Benckendorff.

a) There is a group of authors who focus on engagement strategies and learners' perceived competence in online English learning. Martin, F., Bolliger, DU, and other scholars pay more attention to engagement strategies and learners' perceived ability in online environments, and how to improve learners' perceived ability by designing different engagement strategies. The research focus of this group is to make use of the perfect integration between effective teaching design and modern digital technology to design practical teaching that can improve learners' performance and engagement. Therefore, research also focuses more on the different effects of traditional teaching strategies on learners when applied to online learning environments (Martin, F. et al., 2018). Martin and Bolliger collaborated to study the impact of engagement strategies on learners' perceptions. Based on Moore's interaction framework model, the "Development of the Online Engagement Strategies Questionnaire" jointly developed by Martin and Bolliger Explores the impact of learner-learner interaction, teacher-learner interaction, and learner-teaching content interaction on teachers' and learners' perceived ability of online engagement strategies, to explore the effect of online learning and learners' performance. The study found that learners attach more importance to teacher-related engagement strategies, such as providing grades and sending regular notifications. Martin et al. also studied the impact of various facilitation strategies on learners' perception (Martin, F. et al., 2020). His relevant research results show that teachers' timely response to problems and close connection and interaction with teachers are factors that can effectively improve learners' perceptions. The two studies help teachers make efficient use of the convenience of online teaching, design teaching activities reasonably, and use effective teaching strategies to improve learners' online English learning engagement.

b) A comparative study focuses on the effects of online and offline classes on learners' achievement and cognitive engagement. Hew, K.F. et al's research mainly focused on the comparative study of the influence of different classroom teaching modes such as traditional classrooms, flipped classrooms, and online traditional/flipped classrooms on learners' achievement and cognitive engagement (Hew,

K.F. et al., 2019). The research variables of this group are traditional class, flipped class, and online flipped class. Hew and K.F. flipped the study of the cognitive engagement of learners through online and offline teaching modes, learning performance, motivation, and so on. The study not only further confirmed the positive effect of flipped classrooms on learners' learning motivation and engagement compared with traditional classrooms, but also found that the promoting effect of flipped classrooms is also applicable to online learning, and flipped classrooms can improve learners' engagement and learning achievement better than traditional classroom and online self-learning courses. Follow-up interviews also show that learners' internal peer interaction is also an important factor in improving learners' achievement and cognitive engagement. Hew, K.F. et al. also paid attention to the specific factors affecting learners' participation in online distance learning after online courses became the mainstream teaching mode in the era of COVID-19 and post-COVID-19. From the perspective of activity theory, they explored the influences of emotions and specific teaching activities on learners' online English learning engagement. And they found that some tension or conflicts in class will greatly hinder learners' learning engagement, such as very limited online rest time and too long online presentations, which will cause learners to have negative emotions and affect their online English learning engagement. The research results of this group of authors have certain reference significance for how teachers arrange online teaching activities to improve learners' classroom performance and learning engagement, as well as how learners adapt to different online and offline teaching modes.

c) Another author group studied MOOCs and learning engagement, etc. Different from previous studies on MOOC learners' behavior and other aspects of learning engagement, Pierre

et al's research focuses on learners' more comprehensive learning engagement, including cognition, behavior, emotional engagement, and social engagement, and pays more attention to the importance of learners themselves in MOOC learning. Unlike other online classroom models in which schools or teachers choose online teaching or web-assisted teaching due to external conditions, MOOC learners have a high degree of freedom in choosing their online open courses. This group of authors also seeks to amplify this feature of MOOCs through related research. In the relevant research, Pierre et al. divided MOOC learners into three typical types and explored the differences in learning outcomes of different types of learners by controlling for factors such as teaching environment (course length, course assessment form, etc.). Relevant research results show that MOOC platforms can attract different types of learners by designing course arrangements, thus maximizing the utilization of resources. The group also explored the influence of a learner's self-efficacy on learning engagement and performance and confirmed that self-efficacy has a significant impact on learning engagement in online teaching and online learning.

3.2.2 Analysis of Highly Cited Literature

The number of citations reflects the academic influence of a paper in this field. This paper focuses on analyzing the top 10 articles with cited frequency, analyzing the co-occurrence of keywords, and the whole article to present the research classics in this field to a certain extent. The collected literature data were sorted by WOS according to "cited frequency: highest priority", then the data were exported and summarized. Since the 10th and 11th were cited with the same frequency, the 11 articles of data were finally collected, the keyword matrix was made and imported into UCINET, and the keyword co-occurrence graph was drawn using NetDraw, as shown in Figure 2.

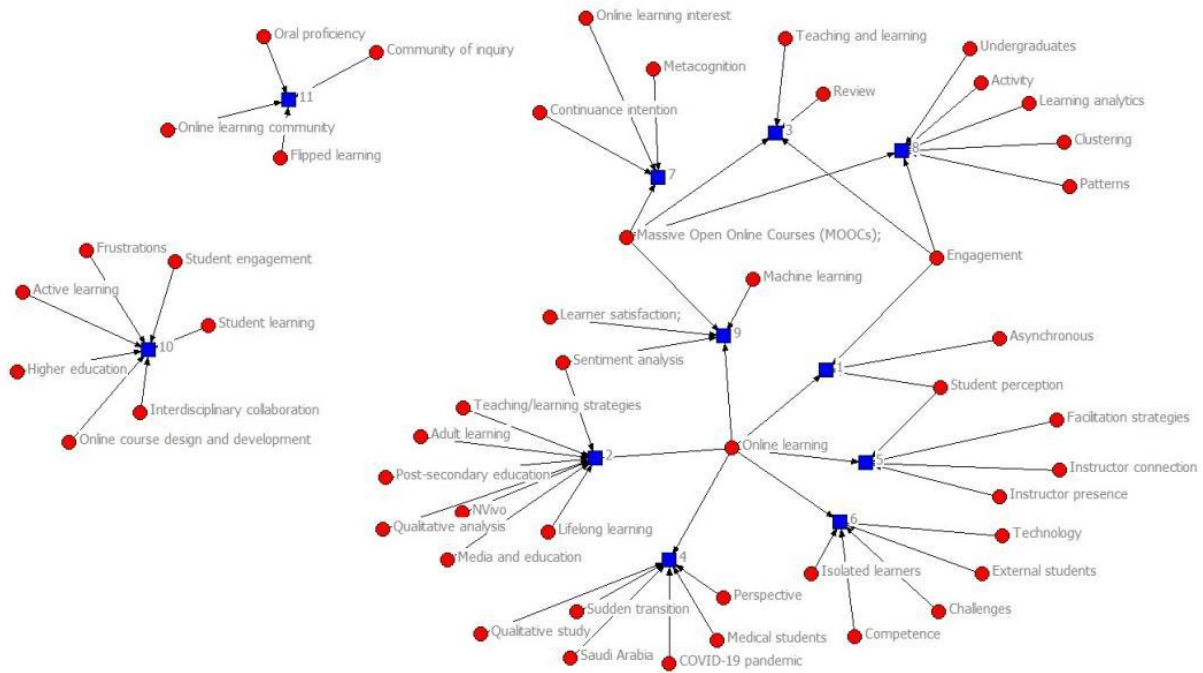


Figure 2. Keyword co-occurrence graph of highly cited literature

Through observation and analysis of Figure 3, we can find that in addition to the corresponding keywords of online learning and engagement selected in literature retrieval, the focus of highly cited literature research can be divided into several modules, such as 1) technology and education and teaching strategies and 2) clustering of learner perception and emotion of online learning.

The keywords of technology and education cluster include media and education, technology, machine learning, online course design and development, etc. Related articles focus on the following: a) the advantages and disadvantages of the change of education mode brought by science and technology to teaching; b) how teachers adapt to different online teaching modes through timely adjustment and selection of appropriate teaching strategies; c) the impact of the change of education model on higher education in the post-epidemic era, and the teaching effect of flipped classroom and other new classes when applied to online teaching. The research results are mostly suggested conclusions, as well as explanations of different online and offline teaching modes, as well as point out the similarities and differences between them and the possible impact on learners; some studies explore the effects of traditional teaching strategies when applied to the classroom. It can be found that the research

under this cluster did not dig deeply into the influence of online learning environments on learning engagement. The reason may be that the popularity of online teaching is not widespread enough. It is still in the initial and rapid development stage, teachers and learners have not completely adjusted from offline face-to-face teaching to remote classrooms, and relevant technologies are not fully mature. There is no guarantee that the nature and formal degree of the course are completely consistent with the offline course.

The keywords of learner perception and online learning emotion clustering include student perception, active learning, frustration, learner satisfaction, online learning interest, etc. Articles in this cluster mainly explore the influence of different variables in online learning on learners' emotional and cognitive levels, and then affect learners' online engagement. Among them, Martin F. et al's 2018 article "Engagement Matters: Student Perceptions on the Importance of Engagement Strategies in the Online Learning Environment" is the most cited document in online English learning. The research theme has also shifted from teaching strategies to focus more on learners' cognition and emotion, not only paying attention to the learning engagement of learners in online classes, such as behavior, when they change from traditional face-to-face contact classes to remote online

classes but also paying more attention to the changes in learners' emotional and cognitive levels. Based on Moore's Interaction Framework and the comparison of different types of problems, this paper explores learners' emotional and cognitive changes in class, as well as the impact of these changes on learners' active learning and online learning interests. The research results show that the physical distance between teachers and students is extremely enlarged in the online teaching mode. Teachers should pay attention to narrowing the emotional distance between teachers and students, maintain effective communication between teachers and students, reduce the tension and anxiety of learners in online classes, and maintain stable communication through timely adjustment of teaching strategies, to ensure the effectiveness of online English teaching. They should improve learners' positive emotions and satisfaction with learning, inducing learners to carry out active learning, to further improve online English learning engagement.

4. Analysis of Popular Research Topics in International Online English Learning

Engagement

Keywords are the most concise of the article, and a full analysis of keywords can give a more profound understanding of the research focus in the field of online English learning engagement. The keywords of highly cited articles analyzed in the previous section reflect the research hotspots and main research perspectives in this field. This section also illustrates the research emphases and main research achievements in the field of online English learning engagement in the past five years in the form of clustering after analyzing the keywords of all literature. All the obtained 553 pieces of data were imported into CiteSpace software, the keyword co-occurrence graph was generated, and the keyword clustering was set to display. The clustering generated by the software is shown in Figure 3. After removing the keyword clustering of "student", "English learner" and other keywords with too broad meanings, the keyword nodes in the figure are integrated, and finally, 4 clusters are obtained, which represent the research field of online English learning.

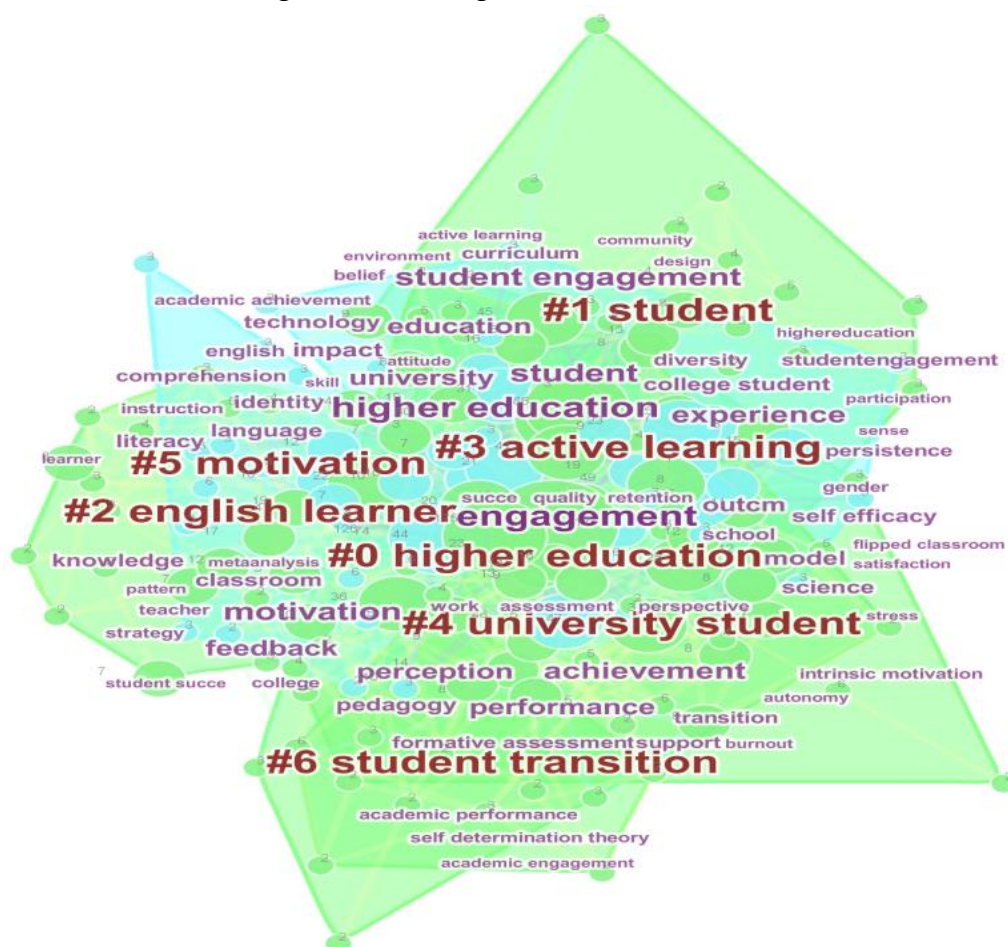


Figure 3. Co-occurrence map of keywords input in online English learning

Cluster I: Study on the influence of teaching mode change and learners' learning/learning engagement. The keywords included in this cluster are transition, self-determination theory, burnout, and autonomy. By comparison, it can be found that the relevant research under this cluster mainly focuses on the impact of the new teaching mode formed after the application of new technologies in the classroom on learners' learning, and then explores the impact on learners' learning engagement. It can be divided into two phenomena: the new teaching mode helps learning or hinders learning. On the level of new teaching modes helping learning, most studies confirm the positive effects of web-based assisted classrooms or online classrooms on the provision of a learning environment, the sharing of teaching resources, and the promotion of teacher-student communication. The study found that compared with online classes, online classes have more freedom in time and place, and learners have more opportunities to complete the course. In addition, most online teaching resources can be saved for a long time for learners to download and use on their own, which greatly avoids the phenomenon that learners cannot review after the end of the course and improves the initiative of learners. In the context of online learning, teachers and students can communicate through voice or video. The research results show that compared with offline face-to-face interaction between teachers and students, remote communication can reduce their tension and other negative emotions, that is, maintain a lower affective filter in learning, thus promoting learning. On the contrary, some studies have found that the new teaching mode not only does not promote learning but even hinders learning. Some scholars have found that different from MOOC and other open online courses, which are generally selected according to learners' own needs or interests, with the introduction of network technology into the classroom, more teaching modes are used by English teachers to conduct online teaching, and the learners are mostly school students who need to be restrained by teachers. Therefore, in the early stage of the application of the new class, the classroom teaching mode is still similar to the offline one. Limited by the distance brought by remote teaching, teachers cannot observe the state of learners in time. The interview also shows that some learners believe that although

online courses relieve the tension of teacher-student communication. They also reduce the formal level of the course, and are more likely to be distracted and dazed in class.

Cluster II: A study on online English learning engagement and learning outcomes. The keywords involved in this cluster include success, quality, work, and retention. The study of this cluster mainly explores the relationship between online English learning engagement and learning outcomes, mainly from the perspective of excellence and persistence of learning outcomes. Some studies have found that online English learning engagement is the key factor to improve the learning outcome of online courses. The research points out that students' internal factors have always been the decisive factor affecting their student outcomes, and although there will be teacher-student, student-student, and other interactions in online classes, it is more dependent on learners' self-efficacy in more situations. Students can improve their learning quality by being more involved in the classroom, and thus achieve better learning results. Studies have also found that highly engaged learners are more likely to achieve better results in online English learning than those who are less engaged. Interviews and post-test data also show that the vast majority of students who are highly engaged in online English learning can achieve higher scores in the delayed post-test and have a longer willingness to learn.

Cluster III: Study on the relationship between online English learning engagement and learners' emotions and cognition. The keywords of this cluster include active learning, motivation, perception, self-efficacy, and satisfaction. This cluster mainly studies 1) the relationship between learners' emotions and online English learning engagement; and 2) the factors affecting learners' perceived engagement strategies. When studying the relationship between emotion and online English learning engagement, compared with cluster I, the analysis of this part is to systematically analyze emotion, motivation, and online English learning engagement at a deeper level. Learning engagement can be divided into three levels: behavioral, cognitive, and emotional. Studies have shown that learning motivation has a significant impact on both affective and behavioral engagement, and affective engagement has a significant impact on cognitive engagement (Yang Gangdai &

Zhaohui, 2021). Studies have shown that learners' learning engagement in class can improve their satisfaction and learning motivation. In online teaching scenarios, learners with high learning engagement also have lower loneliness, are more able to tolerate independent learning, build closer teacher-student relationships with teachers, and improve their performance in online courses. Similarly, some scholars have found that learners' positive or negative emotions and different classroom experiences generated by different emotions are also key factors affecting learners' online English learning engagement, especially at the level of emotional engagement. The research finds that generally speaking, positive emotions promote the improvement of learning engagement, while negative emotions will reduce learners' learning engagement, thus making learners have free emotions during learning and are out of the classroom, which is not conducive to learning. In addition, at the level of research on the influence of learners' perceived engagement strategies, some studies affirm the important role of learning engagement in online courses and compare learners' perceptions of different engagement strategies through the design of experiments. Most studies divide learners into three interactive groups: learner-teacher, learner-learner, and learner-teaching content. Most of the results show that the teacher-student group is the most effective in improving online English learning engagement, and different groups have different strategies that can promote the most effective engagement.

Cluster IV: Study on the factors influencing online English learning engagement. The keywords of this cluster include instruction, technology, curriculum, design, feedback, and environment. The cluster is mainly divided into two levels: 1) the influence of network technology/environment on learners' online English learning engagement; and 2) the influence of teaching strategies on online engagement. At the network level, it is mainly reflected in the degree of adaptation between students and the teaching platform, which has similar research points as clustering but focuses more on the impact of different classes or learning environments created by the network on learners. They find that a stable classroom environment that meets the needs of teacher-student/student communication can

better improve learners' online English learning engagement. The reason may be that at this time, the learning environment cannot only satisfy learners' independent learning but also enable learners to carry out cooperative learning methods such as group discussion, which expands the feasibility of learning. At the level of teaching strategies, some studies have explored the effect of teachers' classroom activity arrangement on online English learning engagement. The research results show that similar to offline classes, rich classroom activities and appropriate rest time can improve learners' engagement. However, it is necessary to adjust the arrangement of classroom activities to fit remote teaching. In addition, we should pay attention to the choice of rest time and rest time. Some scholars found that the rest time of online classes should be less than that of offline classes, possibly because online classes require more energy for learners to recover from class. Some studies also discuss the influence of feedback on online learning strategies, and the results show that formative assessment has a significant role in improving online English learning engagement.

Summarizing the results of cluster analysis, it can be seen that in the five years, the research on online English learning involvement mainly has the following characteristics: 1) Pay attention to the comparative study between different classes. With the wide application of the flipped classroom model, there are more forms of online classes, and the comparative study between different classes can better highlight the factors affecting learning engagement in online English classes, etc.; 2) the importance of emotion and cognition in English learning is emphasized. Emotion plays an important role in English learning. Learning engagement is closely related to learning motivation and learner emotion, etc. Researchers have paid more attention to the relationship between emotion and online English learning engagement in recent years. At the same time, some researchers have further explored the influencing factors and characteristics of Online English learning Engagement by exploring the dimension composition of learning engagement and testing the validity of the Online Engagement Strategies Questionnaire.

5. Conclusions

Based on the WOS database as the main data support, this paper uses CiteSpace and UCINET

bibliometric analysis software to visually analyze 553 kinds of literature on online English learning engagement included in the WOS core collection from 2017 to 2021 and draws the relevant graph. It presents the research hotspots, core authors, and high-impact literature on online English learning engagement, and to a certain extent reviews the current international development trends of relevant research on online English learning engagement. The results show that the leading countries/regions in online English learning engagement are mainly the United States, etc. The research focuses on the differences between online teaching modes and traditional courses, the impact on teachers' choice of strategies and learners' emotional cognition, and then discusses the changes in learners' online English learning engagement. In addition, it is also found that although the research results of Chinese scholars have made some achievements in the world. There is still a certain gap between them and other countries, and the research on online English learning engagement in China is not very popular and is still in the developing stage.

Therefore, more Chinese researchers should pay more attention to online English learning engagement research. With the development of science and technology, the new teaching model is constantly updated, and online teaching or network-assisted teaching occupies a more and more important position in English learning. Current research results have shown that similar to traditional classrooms, teaching strategies and learners' emotions greatly impact learners' current learning engagement. Future studies may combine advanced language testing technologies to investigate the language knowledge, language ability, and language application ability of learners from different class groups and explore their relationship with online English learning engagement, to further promote the development of relevant research.

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